

Pre-training a model on a large dataset with YOLOv8, and retraining this model on tiny datasets, it effectively detects specific features previously undetected

A Hierarchical Approach to Pest Detection Using Few Shot Learners and Small Datasets

INTRO

- Advances in machine learning offer new solutions to the issue of pest detection.
- Pests prevalent in South Africa, such as the *Sirex* and *Gonipterus*, are underrepresented in existing models and data sets.
- We address this gap by training a model to detect the *Sirex* and *Gonipterus* pests and identify the underlying attributes of insects.

METHODS

- A YOLOv8n model was retrained using the IP102 public dataset containing 19 000 box annotated images of insects prevalent in Asia.
- This model was then augmented with data from the Forestry and Biological Institute (FABI), containing 142 *Gonipterus* and 42 *Sirex* photos.
- Annotating specific features, 7 models were retrained, focusing on detecting:
 - The *Sirex* and *Gonipterus* life stages
 - Any insect
 - Flying insects
 - Larvae
 - *Sirex* larvae
 - *Sirex* adults
 - Wings

👤 Marc Gagiano, Stephan Kersop

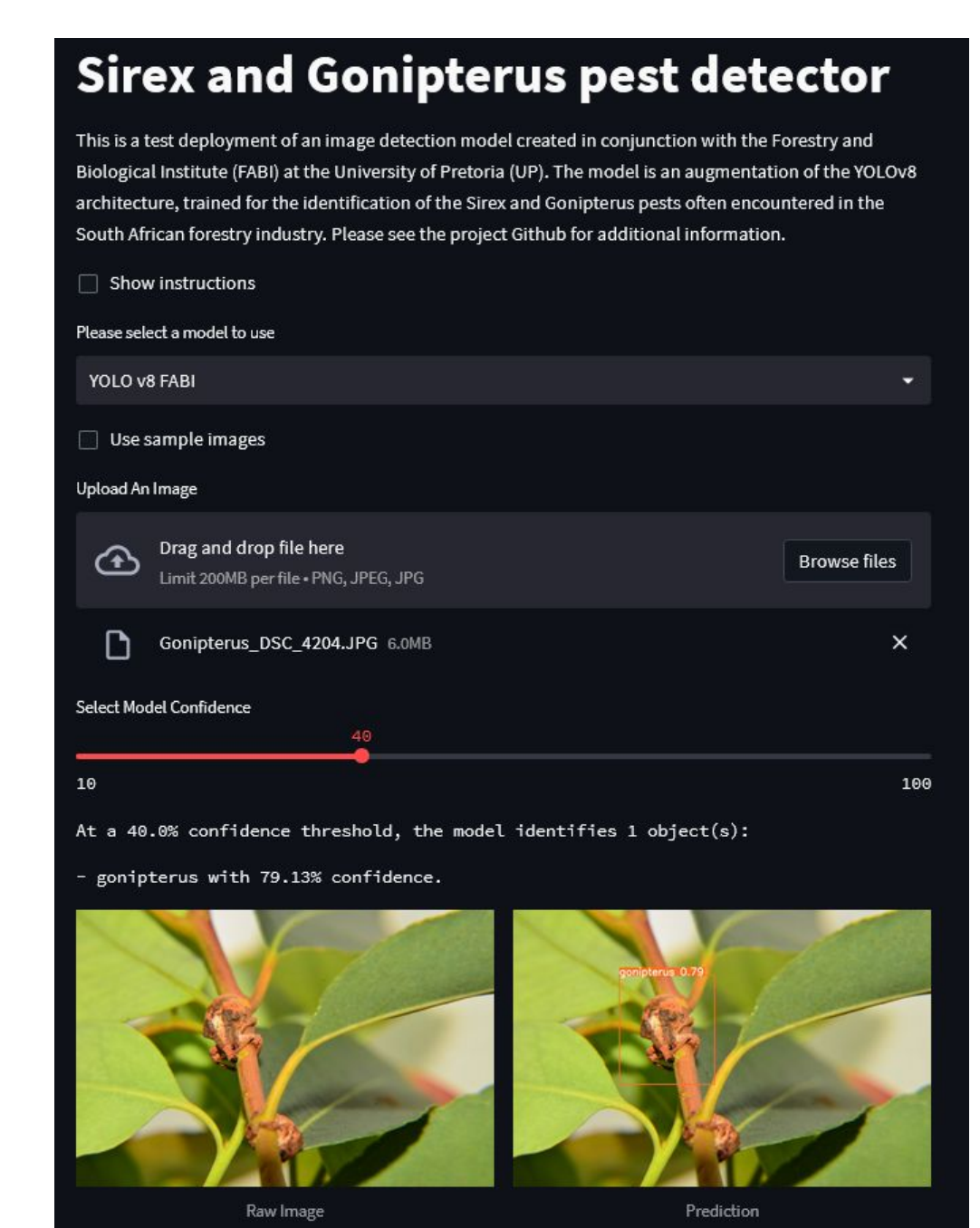
RESULTS



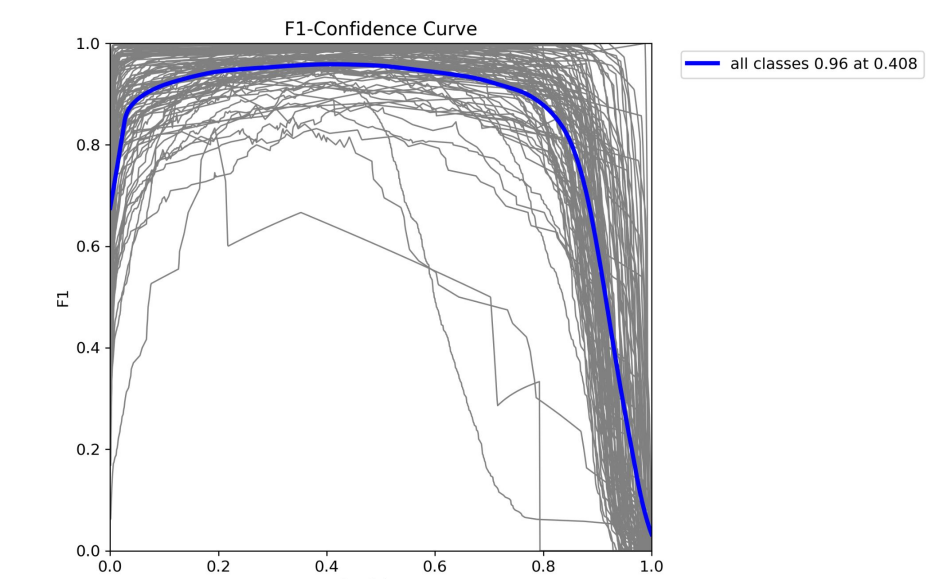
DISCUSSION

- Training an object detector on tiny datasets are challenging.
- Part of the challenge is solved by pre-training on a larger public datasets
- The solution is further enhanced by annotating specific features on various images and retraining individual models for each of these features
- The features one model misses will be picked up by one of the other models
- Identifying one single feature already reduces time spent on classification tasks

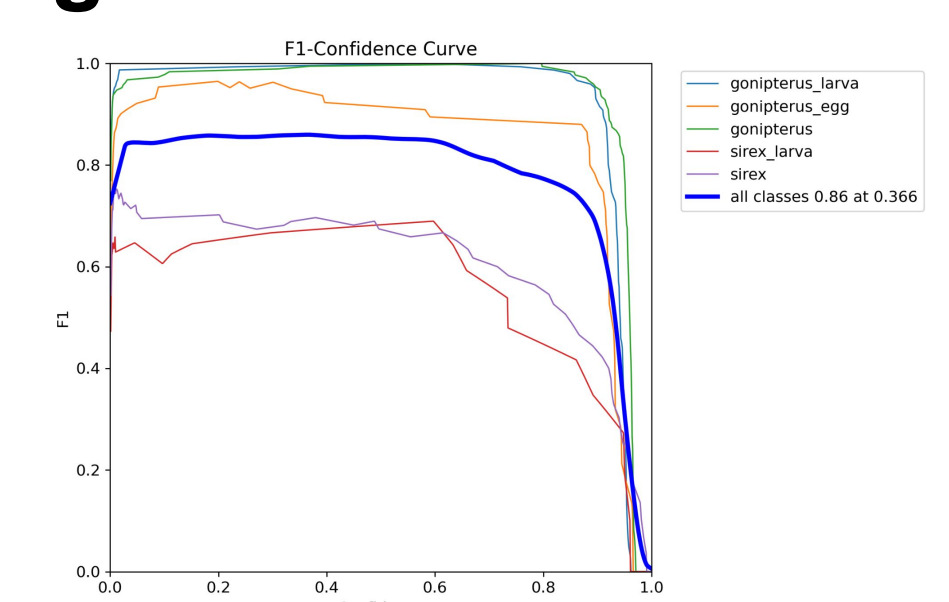
More Information Streamlit App:



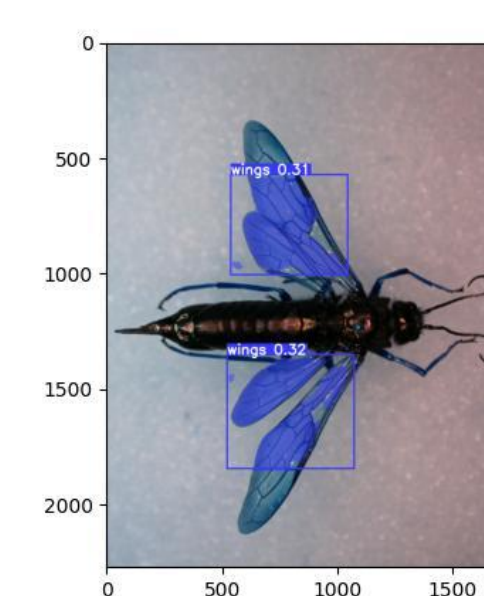
IP102 Model Performance:



Lifestage Model Performance:



Segmentation Model:



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